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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
WEST, JEFFREY R	

ART UNIT	PAPER NUMBER
2857	

DATE MAILED: 10/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/702,293	BONET, ANTONIO TRIAS	
	Examiner	Art Unit	
	Jeffrey R. West	2857	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 July 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 July 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *07/05/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The amendment filed July 05, 2005, is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention.

The added material which is not supported by the original disclosure is as follows:

The amendment to the paragraphs bridging pages 5 and 6, contains a new summary of art cited by the Examiner in the last Office Action. Such art was not discussed in the disclosure as originally filed.

The amendment to paragraphs 0044 and 0045 on page 11, paragraphs 0081. 0083, 0084, and the new paragraph starting on line 17 of page 16, and the first and newly added paragraphs on page 18, changes the original method to use holomorphic embedding and cancels the supported and originally disclosed method of homotopy.

The two new paragraphs added beginning at line 17 of page 15, presents a new summary of what was originally disclosed in Figures 1a-1e, but also adds new matter that "the set of points for which the problem will converge to the physical solution is fractal: we can find two values as close as desired having convergence to the physical solution for the first one and convergence to the spurious, or no convergence, for the other. Additionally, if you increase the load, the set of points

without convergence grows up until it covers all the possibilities except the solution at the voltage collapse point."

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-7 and 9-11 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 1, 5, 9, and 11 are rejected as failing to comply with the written description requirement because they have been amended to eliminate the supported homotopy method and replace the homotopy with holomorphic embedding. The claimed methods for holomorphic embedding have no support in the original disclosure and are only supported by new matter added to the disclosure, and therefore these holomorphic methods were not described in the specification in such a way as to reasonably convey to one skilled in the relevant art

that the inventors, at the time the application was filed, had possession of the claimed invention

Claims 2-4, 6, 7, and 10 are rejected under 35 U.S.C. 112, first paragraph, because they incorporate the lack of written description present in their respective parent claims.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 9 is considered to be vague and indefinite because it attempts to further limit parent claim 8 to include "holomorphic embedding (L(s)) formed from said load flow equations (L) in a neighborhood of the no load case values (M1) of each quantity." Parent claim 8, however, already defines "load flow equations (L(s=0))" and therefore it is unclear to one having ordinary skill in the art how claim 9 can further limit claim 8 to define "holomorphic embedding" as "L(s)" when a zero case of L(s) has already been defined as "load flow equations" as well as redefine the "load flow equations" from a specific "L(s=0)" to "L(s)". Similarly, it is unclear to one having ordinary skill in the art how claim 9 can define a "no load case value" as "M1" when parent claim 8 already defines "M1" as a "first mathematical model".

Claim 10 is rejected under 35 U.S.C. 112, second paragraph, because it incorporates the lack of clarity present in parent claim 9.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claim 8, as may best be understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Okumura et al., "A Computation of Power System Characteristic by General Homotopy and Investigation of its Stability" in view of Numerical Recipes, "Evaluation of Continued Fractions".

Okumura discloses a method for determining the state of stability of an electrical grid having n nodes (page 2745, columns 1-2, "Equation of Power System") comprising the steps of embedding load flow equations representing the electrical grid in parametric homotopy (page 2745, column 1, "Abstract" and page 2745, column 2 to page 2746, column 1, "Solution by HCM") that goes from a first mathematical model, comprising a known 0-case (i.e. s=0), in which all voltages are equal to a normal or designed voltage level and there is no energy flow in links of the grid (i.e. flat start), to a second mathematical, comprising an objective case (i.e. s=1) representative of the grid in the current load condition for which stability is to be determined (i.e. load flow solution) (page 2746, column 1, "Solution by HCM"),

wherein the second mathematical model is developed in power series values of the load flow equations' unknowns in the parameters of the parametric homotopy in a neighborhood of the 0-case value of each parameter (page 2746, column 1 to column 2, "Solution by HCM" through "Stability Investigation of Solutions"), and displaying the solution to the load flow equations as a measure of the state of load stability of the electrical grid (page 2746, column 2, "Several Examples" to page 2747, column 1, "PG V-Curves and Stability").

Okumura discloses developing a power series expansion of all quantities in a parametric homotopy formed from said load flow equations in a neighborhood of the 0-case value of each quantity (page 2746, column 1, "Stability Investigation of Solutions").

As noted above, the invention of Okumura teaches many of the features of the claimed invention and while Okumura does teach determining stability by performing a power series expansion in order to determine a load flow solution if/when the result of the equation converges (page 2746, column 1, "Stability Investigation of Solutions"), Okumura does not specify determining the solution using analytical continuation.

Recipes teaches the use of continued fractions to determine when a solution results from conversion of a power series and using a result that relates to continued fractions to rational approximations (i.e. analytical continuation) by evaluating a n-order algebraic approximant of the continued fraction for a sum of power series coefficients (page 169-170, "Evaluation of Continued Fractions").

It would have been obvious to one having ordinary skill in the art to modify the invention of Okumura to include determining the solution using analytical continuation, as taught by Recipes, because, as suggested by Recipes, the combination would have improved the efficiently of the method of Okumura in the common applications containing lengthy power series, by determining the convergent much more rapidly than the power series expansion of Okumura (page 169, "Evaluation of Continued Fractions").

Response to Arguments

8. Applicant's arguments with respect to claims 1-11 have been considered but are moot in view of the new ground(s) of rejection.

The following arguments, however, are noted:

Applicant argues that "[t]he Okumura et al. reference and the Numerical Recipes reference are directed to use of a homotopy and continued fractions. The present invention does not use a homotopy, nor does it use continued fractions. Rather it uses a holomorphic embedding and algebraic approximants. As Okumura et al. in combination with Numerical Recipes neither teach nor suggest such a method as claimed, Claims 1, 5, and 8-10 are patentably distinguished."

The Examiner first asserts that, as noted above, the changes to the specification regarding holomorphic embedding is considered to be new matter and the changes to the claims regarding holomorphic embedding does not comply with the written description requirement.

The Examiner also asserts that while the claims have been amended to include an "algebraic approximant" rather than "continued fraction", the specification explicitly defines algebraic approximates as continued fractions (See for example, page 11, lines 11-12, "For suitable analytical continuation techniques using algebraic approximants (continued fractions, for instance)" and page 20, lines 1-2, "An algorithm for constructing an algebraic approximant (e.g., a continued fraction approximation)").

The Examiner further asserts that Applicant's arguments are not persuasive with respect to independent claim 8 since claim 8 contains no limitations regarding "holomorphic embedding" or "algebraic approximation".

Applicant also argues that "there is no motivation or suggestion to combine the teachings of Okumura and Numerical Recipes, nor to combine the teachings with Rehtanz" but fails to provide any reasoning for why the Examiner's proposed motivation is insufficient.

The Examiner maintains that it would have been obvious to one having ordinary skill in the art to modify the invention of Okumura to include determining the solution using analytical continuation, as taught by Recipes, because, as suggested by Recipes, the combination would have improved the efficiently of the method of Okumura in the common applications containing lengthy power series, by determining the convergent much more rapidly than the power series expansion of Okumura.

The Examiner also maintains that it would have been obvious to one having ordinary skill in the art to modify the invention of Okumura and Recipes to specifically disclose confirming whether the solution is physical by continuously obtaining the steady state information from a supervisory and data acquisition system collecting data from the electrical grid in communication with a microprocessor-controlled energy management system comprising executable computer instructions, as taught by Rehtanz, because, as suggested by Rehtanz, the combination would have provided a common supervisory system for using the method of Okumura and Recipes to improve power systems by controlling the power generation and load flow, insuring that accurate control takes place quickly by confirming the existence of a solution, and avoiding delay between data capture and subsequent corrective actions.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to Applicant's disclosure.

U.S. Patent Application Publication No. 2003/0040846 to Rehtanz et al. teaches stability prediction for an electric power network including a supervisory control and data acquisition adapted to continuously collect data from an electrical grid indicative of electrical conditions of said electrical grid (0002, lines 1-17), said supervisory control and data acquisition system being in communication with a microprocessor controlled energy management system comprising executable computer instructions

(0012, lines 1-10 and 0025, lines 9-12) to determine a continuous, real-time estimate (0036, lines 1-6 and 0060, lines 1-10) of the stability of the electrical grid (0004, lines 1-5) by generating a solution to load flow equations (0029, line 16 to 0030, line 3) as well as confirm that a set of voltages are representative of a physical electrical state (i.e. a real solution exists) (0034, lines 1-15 and 0064, lines 1-6).

U.S. Patent Application No. 2001/0040446 to Lapinski et al. teaches an apparatus and method for the measurement and monitoring of electrical power generation and transmission.

U.S. Patent No. 6,785,592 to Smith et al. teaches a system and method for energy management.

Tolikas et al., "Homotopy Methods for Solving Decoupled Power Flow Equations" teaches the application of different homotopies to solving the load flow problem.

Zhigang et al., "A New Method to Calculate Multiple Power Flow Solutions" teaches a new method to calculate multiple power flow solutions using the concept of homotopy continuation method and toroidal mapping.

Salam et al., "Parallel Processing for the Load Flow of Power Systems: The Approach and Applications" teaches a homotopy-based computational parallel algorithms for solving for all the roots of a system of algebraic polynomial equations.

Guo et al., "The Real Homotopy-Based Method for Computing Solutions of Electric Power Systems" teaches a method to calculate the roots of any system of polynomial equations in n real variables.

Guo et al., "The Homotopy Continuation Method to Approach Voltage Collapse of Electrical Power Systems" teaches a homotopy continuation method to approach voltage collapse point by tracing system operation conditions near or at the system bifurcation point.

Iba et al., "Calculation of Critical Loading Condition with Nose Curve Using Homotopy Continuation Method" teaches a new method for calculating power systems nose curves and critical loading conditions.

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Jeffrey R. West whose telephone number is (571)272-2226. The examiner can normally be reached on Monday through Friday, 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc S. Hoff can be reached on (571)272-2216. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

jrw
September 28, 2005

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